```
************************************************************
*                                                        *
*                 CAMBEX CORPORATION                     *
*                                                        *
*       EDX CARTRIDGE TAPE COPY PROGRAM V2M2             *
*                                                        *
*                   USER'S GUIDE                         *
*                                                        *
************************************************************
```

A GOOD PLACE TO PUT YOUR INFORMATION

CAMBEX CORPORATION
3650 ANNAPOLIS LANE N.
PLYMOUTH, MN 55441

```
**********************************************************************
*                        REVISION RECORD                            *
**********************************************************************
*                 *                                                 *
*   REVISION      *          DESCRIPTION                            *
*                 *                                                 *
**********************************************************************
*                 *                                                 *
*       A         *                                                 *
*   (5-13-85)     * Documentation released - EDX Cartridge Tape Copy *
*                 *              Program V2                          *
*                 *                                                 *
*       B         * Documentation released - EDX Cartridge Tape Copy *
*   (3-15-86)     *              Program V2M1                        *
*                 *                                                 *
*       C         * Documentation released - EDX Cartridge Tape Copy *
*   (8-26-86)     *              Program V2M2                        *
*                 *                                                 *
*       D         * Documentation released - EDX Cartridge Tape Copy *
*   (12-24-86)    *              Program V2M2 Revision D             *
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* ********************************************************************
*   Publication No. *
*     22250834      *
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PREFACE

The Cambex EDX TPCOPY22 Program V2M2 is an EDX V3, V4 and
V5 multi-purpose interactive program that performs data backup (SAVE)
and retrieval (RESTORE) functions on a CDC 80810-10 Streaming Tape
Cartridge Drive attached to a Series/1 computer. The program also
performs tape maintenance functions.

The Cambex EDX TPCOPY22 Program is provided on a single sided
Cambex supplied diskette (part number 22250833 Revision E).
Questions or comments concerning this program may be directed to:

        Cambex Corporation
        3650 Annapolis Lane N.
        Plymouth, Minnesota 55441
        Telephone: (612) 559 - 3387

****
*   This program is distributed on an "as is" basis,   *
*   without warranty either expressed or implied.   *
****

        This program is intended for use only as described
        in this document. Cambex cannot be responsible
        for the improper functioning of undescribed features
        or undefined parameters. Additionally, this program is
        intended only for use with IBM EDX V3, V4, or V5 as supplied
        by the IBM Program Information Department (PID).
        The results obtained in attempting to use non-standard
        IBM software cannot be guaranteed to be as desired.

CONTENTS

INTRODUCTION

The TPCOPY22 program is a utility that runs on IBM Event Driven
Executive Version 3 or later operating systems for IBM Series/1
computers.
The program facilitates the saving of disk data on cartridge tape
and also allows the restoring of data from the cartridge tape to
disk. The program will facilitate the saving and restoring of data
on all levels, i.e. device, volume and data set level. Also, the
whole backup procedure can be executed automatically from a previously
created data set containing all the commands. The full screen text
editor is used to create this data set.

RESTRICTIONS

There are some restrictions that are imposed by the Cambex program.

1. The program will run only on the IBM EDX version 3 or later release.

2. The program only supports devices included in the EDX system
   generation.

3. While performing a SAVE or RESTORE function the system should not
   be executing any other tasks as the following problems can occur:

   > The time required to execute a SAVE/RESTORE task may be
   > unnecessarily long if executed while other tasks are executing
   > because the streaming of the tape could be interrupted.

   > The other tasks may be modifying the data to be SAVEd/RESTOREd
   > by the SAVE/RESTORE task.

4. The EDX TPCOPY22 program product is not compatible with TPCOPY20
   or earlier releases in that a SAVE performed by V2M0 or earlier
   cannot be RESTORED with V2M2. This is because the buffer size
   has been altered.

5. When performing a Save All (SA) or Save Member (SM) operation the
   user must ensure there is enough space on the IPL volume to
   allocate one 120 record data set to be used for a work area.

6. When performing a Restore All (RA) or Restore Member (RM) operation
   the user must ensure there is enough space on the IPL volume to
   allocate two 120 record data sets to be used for work areas.

7. For EDX V5 users with 4956E processors, programs must be loaded in
   static partitions.

8. ALX data sets are not supported at this time.

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MINIMUM HARDWARE/SOFTWARE REQUIREMENTS

The TPCOPY22 utility executes under the IBM Event Driven Executive for IBM Series/1 computers. The utility requires the following minimum hardware configuration.

- Processor - An IBM Series/1 processor with at least 128KB of storage.

- Operator Station - Any operator station supported by the EDX system.

- Disk unit - An IBM 4962, 4963, 4967, 30D OR 60D disk or any of the CDC disks.

- Diskette unit - Any IBM or CDC diskette unit.

- Tape unit - A CDC cartridge tape unit.

The TPCOPY22 utility requires 17KB of memory.

When performing a save option, TPCOPY22 will load another program named TPSAVE22, into the first available partition with enough memory. The TPSAVE22 program requires 32KB of memory.

When performing a restore option, TPCOPY22 will load another program named TPREST22, into the first available partition with enough memory. The TPREST22 program requires 33KB of memory.

If not enough memory is available to load TPSAVE22 or TPREST22 from the TPCOPY22 program see page 7-1 to see how to load TPSAVE22 and TPREST22 directly.

SOFTWARE RECOMMENDATIONS

The Streamer Tape software has been enhanced to provide improved fault
tolerance, additional hardware status, the number of retries for Save
and Restore operations, and a -2 return code for operations with an
excessive number of retries. From an operator perspective, the most
useful aspect will be the number of retries for Save and Restore
operations.

With the addition of reporting the number of retries for Save and
Restore operations, the operator can monitor and maintain a system at
its highest level of reliability. Paramount to reliable operation is
the monitoring and maintenance of the cartridges. The most direct
measure of the quality of the cartridges is a low number of retries or
marginal blocks (the number of marginal blocks indicated in a Certify
or Verify is derived directly from the number or retries).

The Certify command uses a worse case data pattern to test the
cartridge for media flaws, ie, number of blocks rewritten to achieve
a successful read after write. A new good quality cartridge will
typically have less than 10 marginal blocks with 0 marginal blocks not
being an uncommon occurrence. If the number of marginal blocks
encountered during a Certify exceeds 50 or more, it is recommended that
the cartridge be replaced. The Verify will normally have fewer marginal
blocks than the Certify.

For save operations, the number of retries is an indication of the
number of media flaws encountered which have resulted in records being
rewritten (the unit does not break streaming but instead proceeds to
rewrite the record farther down the tape up to 16 times in order to
achieve a successful read after write). Corresponding to the Certify,
the number of retries typically should be less than 10 with a new
cartridge. Cartridges that have more than 50 retries should be
replaced. For Restore operations, the number of retries is an
indication of the number of records which required rereading in order
to recover them (the unit breaks streaming and reverses/re-reads
up to 16 times in order to reread a record).

In conjunction with the number of retries being reported, a -2 return
code has been added. The -2 return code means that the operation was
successful but the number of retries was excessive (50 or more per
cartridge). The -1 return code means that the operation was successful
and the number of retries was acceptable (less than 50 per cartridge).
For Saves or Restores less than a full cartridge, the acceptability
will be determined on a pro rata basis. Thus a short Save with 10
retries may produce a -2 return code and indicate that the maximum
recommended number of retries has been exceeded.

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The List Tape Header (LH) function should be run after all saves are done on a tape to provide an additional check on the overall operation of the tape.

Finally, for two special cases the search for blank tape operation is deleted because it is unnecessary. While in EX mode where an Initialize (I) or Clear (CL) operation has just taken place, the unit will not be requested to search for blank tape since the tape has just been erased and is properly positioned. The search for blank tape for all other instances remains as it was.

HARDWARE RECOMMENDATIONS

Hardware Environmental Conditions

Temperature/Humidity   (Operating 5 to 45 C or 41 to 113 F)

As noted above, the normal office environment will provide excellent service life. However, high temperature and high humidity are particularly stressful to tape life. High temperature also reduces data margins for the media and may result in a higher number of retries.

Temperature/Humidity   (Shipping -30 to +60 C or -22 to 140 F)

While a very wide temperature is permissible for shipping, sufficient time must be allowed for the cartridge to stabilize to room temperature prior to use (approximately 8 hours for extreme temperature situations). As well, the tape should be retensioned 3 or 4 times if subjected to extreme temperature or mechanical shock.

Environmental Particulates

While tape units are not susceptible to head crashes due to particles, their performance can be degraded by prolonged exposure to a dirty environment. In particular since cool air is drawn in from the front of the unit, smoking should be avoided while using the unit.

Maintenance

The only operator maintenance required is cleaning of the heads. Normally the primary source of head contamination is the accumulation of oxide from the tape. New tapes during the first few passes of operation tend to burnish the media resulting in some loose oxide which may cause some accumulation in the head gap. Note the units are by design mounted such that the oxide will fall down out of the cartridge minimizing the possibility of head contamination.

Under normal usage of half an hour a day, the heads should be cleaned every 100 hours or about six months. The introduction of 10 to 20 new cartridges a year should not require additional head cleaning if the routine maintenance is being performed. However, if the unit is indicating more retries than usual on a number of tapes, the heads should be cleaned to eliminate contamination as a potential cause.

NOTE: At present the only recommended operator cleaning of heads should be with a Perfect Data cleaning cartridge using a fluid approved for use on magnetic tape. Alcohol or other unapproved fluids may result in damage to both the media and the plastic/rubber portions of the cartridge.

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Service Life

Under ideal use, the cartridge should provide satisfactory performance for 5000 passes (pass = an operation which moves the tape the length of one track). For a Save operation along with the attendant erase and rewind operations, a total of approximately 12 passes would be required. Thus a cartridge potentially could be used for approximately 500 Saves. In practice, the service life may be reduced to 100 Saves due to environmental or handling stresses.

To determine the serviceability of the cartridges, the number of retries or marginal blocks should be monitored. If the number of retries during a Save or marginal blocks during a Certify exceed 50 per cartridge, the cartridge should be removed from service. The cartridge may successfully operate above this level, but its reliability has been significantly reduced.

Note also that it is normal for the number of retries for a given cartridge to vary somewhat for consecutive Saves on the same unit. As well, there will be a variation in the number of retries when used on different units.

Tape verify should be run periodically on a saved tape to provide an additional check on the overall operation.

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In order to generate an IBM EDX system to support the Cambex EDX
TPCOPY22 Program, the user must change $EDXDEFS and LINKCNTL in
volume EDX002 to support the cartridge tape as an OEM (EXIO) device.

$EDXDEFS must include the EXIODEV statement.
The following is an example of $EDXDEFS on volume EDX002 for V4.0.

```
   $EDXDEF   CSECT
             $ID
   *
   *                         XPS
   *                EVENT DRIVEN EXECUTIVE
   *            VERSION 4, MODIFICATION LEVEL 0
   *


             SYSTEM MAXPROG=(5,5,5,5),PARTS=(32,32,32,32)
   *
   *

             DISK    DEVICE=4964,ADDRESS=02,END=YES
             EXIODEV ADDRESS=4C,RSB=12,MAXDCB=2,END=YES   **CARTRIDGE TAPE**
   *
   *
   *
```

LINKCNTL must include support for the EXIO device.

```
   *
   *
   * ------------------------------------------------------------
   *    EXIO SUPPORT              - MUST BE IN PARTITION 1
   * ------------------------------------------------------------
      INCLUDE IOSEXIO          *3*    EXIO DEVICE CONTROL SUPPORT
```

For EDX V3 and V5, changes to $EDXDEFS are the same as for V4.0.
LINKCNTL for EDX V3 must also include the module shown below. This
module is automatically included by V4.0 and V5.0 LINKCNTL.

```
   INCLUDE EXIOINIT,XS3002    *M*    EXIO INITIALIZATION
```

To install and load the program from disk, the user must copy
the Cambex TPCOPY22 program, using the IBM program $COPYUT1,
to the EDX system and then load the program.

The TPSAVE22 and TPREST22 programs must reside on the IPL
volume to run save and restore from TPCOPY22.

Copy the program from diskette to the IPL volume as follows:

```
 > $L $COPYUT1

 THE DEFINED SOURCE IS EDX002 OK (Y/N)? N
 ENTER NEW SOURCE VOLUME:  CAMBEX

 THE DEFINED TARGET VOLUME IS EDX002 OK (Y/N)? Y
 MEMBER WILL BE COPIED FROM CAMBEX TO EDX002 OK (Y/N)? Y

 COMMAND (?): CALL

 TPCOPY22     83 RECORDS COPIED
 TPSAVE22    153 RECORDS COPIED
 TPREST22    157 RECORDS COPIED

 COMMAND (?): EN

 $COPYUT1 ENDED
```

Load the Cambex TPCOPY22 program from the IPL volume as follows:

```
 > $L TPCOPY22
```

The system responds with the following prompt:

```
CAMBEX CARTRIDGE TAPE UTILITY PROGRAM V2M2
COPYRIGHT, CAMBEX CORPORATION, 1986

COMMAND (?):
```

If a program check occurs when loading TPCOPY22 and R1 has a value of
110, then the error is with an EXOPEN instruction. The most likely
cause is that the module IOSEXIO has not been included in the system.

For new installations follow the procedures on the flowchart
NEW SYSTEM SETUP on page 8-1.

COMMAND PARAMETER DEFINITIONS

SAVENAME
Savename denotes the name you give to saved data on a tape. A savename
can refer to a single file, a group of files, or an entire disk image.
Savenames are 1 to 8 characters in length and can consist of the
following characters: A-Z 0-9 $ & # @ ! % ' ( ) - _

TAPE-ID
Tape-id is the label you assign the tape during initialization.
Tape-ids are 1 to 8 characters in length and can consist of the
following characters: A-Z 0-9 $ & # @ ! % ' ( ) - _

TAPE DESCRIPTION
Tape description is a line of up to 80 characters describing the tape,
entered by the user during initialization.

DEVICE ADDRESS
Device address is an one or two digit hex number entered for the disk
address during a save device (SD) or a restore device (RD) operation.

TAPE ADDRESS
Tape address is a two digit hex number of the streaming tape unit.
The tape address must be entered with the DA command.

DISK-VOLUME
The name of any EDX initialized disk volume.

TAPE-VOLUME
The name of the volume on tape to be used to restore members
to disk using the RM or RA options.

TERMINAL
The name of any terminal or printer included during the system
generation.

TAPE HEADER
The tape header consists of a tape-id and tape description that
is written on the first block of the tape during the Initialization (I)
or Clear (CL) operations.

To display the TPCOPY22 commands at your terminal, enter a question
mark in reply to the prompting message COMMAND(?):

```
COMMAND (?): ?

SAVE FUNCTIONS:
  SD  --      SAVE A DISK DEVICE ON TAPE
  SV  --      SAVE A DISK VOLUME ON TAPE
  SM  --      SAVE A DISK MEMBER(S) ON TAPE
  SA  --      SAVE ALL DATA SETS ON A VOLUME TO TAPE
RESTORE FUNCTIONS:
  RD  --      RESTORE A DISK DEVICE FROM TAPE
  RV  --      RESTORE A DISK VOLUME FROM TAPE
  RM  --      RESTORE A DISK MEMBER(S) FROM TAPE
  RA  --      RESTORE ALL DATA SETS ON A VOLUME FROM TAPE
CONTROL FUNCTIONS:
  LI  --      LIST TAPE FILES
  LH  --      LIST TAPE HEADER
  I   --      INITIALIZE THE TAPE
  CL  --      CLEAR THE TAPE
  ER  --      ERASE THE TAPE
  TN  --      RETENSION THE TAPE
  VF  --      VERIFY THE TAPE (READ TEST)
  CF  --      CERTIFY THE TAPE (WRITE / READ TEST)
  EX  --      EXECUTES COMMANDS FROM A DATA SET
  DA  --      CHANGE TAPE DEVICE ADDRESS
  DO  --      CHANGE PRINTER OPTION
  EN  --      EXIT THE TAPE UTILITY
USE ("ATTN" CA) TO CANCEL CONTROL FUNCTIONS
USE ("ATTN" ABORT) TO CANCEL SAVE/RESTORE FUNCTIONS

COMMAND (?): EN
```

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SAVE COMMANDS

The SAVE commands allow the saving of data at the device level, the volume level, or the data set level. The utility saves data from the source disk to the target tape.

The SAVE commands require the tape to have been initialized using the Initialize (I) command.

The SAVE command requires date and time information before executing any SAVE command option. The SAVE utility determines whether a timer is present on the system and whether the date and time have been set. If the system cannot provide the date and time, the utility prompts the user for the information.

SD - SAVE A DEVICE

The SD option saves the entire contents of a disk device to the cartridge tape.

EXAMPLE: Save a disk device at address 3 on tape.

```
COMMAND (?): SD

APPEND TO TAPE (Y/N) Y

            *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID SAVE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVE003
ENTER DEVICE ADDRESS IN HEX: 03
ENTER DATE MM DD YY: 11 12 84
ENTER TIME HH MM:    4 00

*** WAIT ... SEARCHING FOR BLANK TAPE ***

SAVE DEVICE ADDRESS 0003   USING SAVENAME SAVE003   OK? (Y/N): Y
DEVICE SAVE STARTED

DEVICE SAVE COMPLETED   246000 RECORDS SAVED

SAVE COMMAND (?): EN
```

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Press PF1 key to check the progress of the command during the SD
command execution. Note that checking the progress of command
execution interrupts streaming so that the copy will be interrupted
for about two seconds each time PF1 is pressed.

NOTE: Enter a N or NO to the 'APPEND TO TAPE (Y/N)' prompt
      if you wish to copy to the beginning of the tape. This will
      cause the tape to be re-initialized.

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SAVE PROCESS USING MULTIPLE TAPE CARTRIDGES

The SAVEd data may require more than one tape cartridge. It is recommended having an extra initialized tape cartridge in case the SAVE spans multiple cartridges. If the amount of data does require more than one tape cartridge, the utility assigns a segment number (enclosed in parenthesis) to the savename. Use the LI command to display the segment number.

When the utility detects the end of a tape during execution of the SAVE command option, the utility issues the following prompt.

END OF TAPE ENCOUNTERED. ANOTHER TAPE IS REQUIRED TO COMPLETE THE SAVE.
ANY EXISTING DATA ON THE NEXT TAPE WILL BE LOST.
*** WAIT *** REWINDING TAPE ***
DO YOU WISH TO CONTINUE? (Y/N): Y

If the response is Y or YES the utility issues the following prompt:
INSERT ANOTHER TAPE CARTRIDGE AND HIT ENTER

If the user enters N or NO in response to the prompt to continue on another tape, the utility issues the following message:
SAVE ABORTED BY OPERATOR. SAVE DATA INCOMPLETE.

If the data does require additional cartridges, the user responds as follows:

  . Waits for the current tape to rewind.
  . Removes the current tape cartridge from the drive.
  . Inserts a new tape cartridge into the drive.
  . Enters Y or YES in response to the prompt.

After the user inserts the continuation tape and hits the enter key the utility issues the following information messages:

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE02
TAPE DESCRIPTION
This tape contains ...

If the tape is not blank the following message wilL be displayed:

*** WARNING ***
THIS TAPE IS NOT BLANK. ALL EXISTING DATA WILL BE LOST.
DO YOU WISH TO CONTINUE THE SAVE ON THIS TAPE ? (Y/N)

If the response is Y or YES the utility will re-initialize the tape and continue the save.
If the response is N or NO the utility will prompt for a different tape to be inserted.

SAVE PROCEEDING

SV - SAVE A VOLUME

Use the SV command to save a disk volume on tape.

EXAMPLE : Save volume EDX003 on tape

```
COMMAND (?): SV

APPEND TO TAPE (Y/N) Y

          *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID SAVE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: VOL003
ENTER VOLUME:   EDX003
ENTER DATE MM DD YY: 10 12 84
ENTER TIME HH MM:    4 22

*** WAIT ... SEARCHING FOR BLANK TAPE ***

VOLUME SIZE:  20000 DISK RECORDS
SAVE VOLUME EDX003 USING SAVENAME VOL003    OK? (Y/N): Y

VOLUME SAVE STARTED
VOLUME SAVE COMPLETED   20000 RECORDS SAVED

SAVE COMMAND (?): EN
```

Press PF1 key to check the progress of the SAVE operation.
If the utility detects the end of tape during execution of the SV
option, the utility issues the prompts as described in the earlier
section, SAVE PROCESS USING MULTIPLE TAPE CARTRIDGES.

SM - SAVE SPECIFIC DATA SET(S)

Use the SM command to save specific data set(s) from a disk volume on
tape. This option saves a single data set, multiple data sets or
data sets with a specific prefix. To save all data sets with the
prefix e.g. DES the user enters the prefix followed by enough question
marks to create an eight character name. The question mark(?) is a
place-holder as shown below by the three prefix examples.

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EXAMPLE : Save data set(s) from volume EDX003 to tape.

```
COMMAND (?): SM

APPEND TO TAPE (Y/N) Y

          ***   WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID SAVE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVEDS
ENTER VOLUME:   EDX003
ENTER DATE MM DD YY: 10 12 84
ENTER TIME HH MM:     4 22

*** WAIT ... SEARCHING FOR BLANK TAPE ***

(Enter data set names in one or a combination of the formats
 displayed below)

ENTER DATA SET(S) SEPARATED BY SPACES:
BKPTEST                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
$DISKUT1 $COPY TEST TEST3                        OR

ENTER DATA SET(S) SEPARATED BY SPACES:
DES?????                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
MY?SORTP                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
???SORTP

ENTER DATA SET(S) SEPARATED BY SPACES:  (Hit ENTER to end input)

*** WAIT ... SEARCHING FOR BLANK TAPE ***

SAVE DATA SET(S) USING SAVENAME SAVEDS   OK? (Y/N): Y

BKPTEST   $DISKUT1 $COPY    TEST     TEST3      DEST3     MY1SORTP

SAVE COMPLETED   7    DATA SET(S) SAVED

SAVE COMMAND (?): EN
```

If the utility detects the end of tape during execution of the SM option, the utility issues the prompt discussed in the earlier section, SAVE PROCESS USING MULTIPLE TAPE CARTRIDGES.

SA - SAVE ALL DATA SETS ON A VOLUME

Use the SA command to save all data sets on a disk volume to tape.

EXAMPLE : Save all data sets on volume ASMLIB to tape.

```
COMMAND (?): SA

APPEND TO TAPE (Y/N) Y

        *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID SAVE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVEASM
ENTER VOLUME:   ASMLIB
ENTER DATE MM DD YY:  9 12 84
ENTER TIME HH MM:     1 22

*** WAIT ... SEARCHING FOR BLANK TAPE ***

SAVE DATA SET(S) USING SAVENAME SAVEASM  OK? (Y/N): Y

(A list of all the data sets saved is displayed on the terminal)

SAVE COMPLETED   50    DATA SET(S) SAVED

SAVE COMMAND (?): EN
```

If the utility detects the end of tape during execution of the SM option, the utility issues the prompt discussed in the earlier section, SAVE PROCESS USING MULTIPLE TAPE CARTRIDGES.

RESTORE COMMAND

The RESTORE command allows the restoration of data from a tape cartridge to a disk device. The restored data was previously saved on the tape cartridge. The data can be restored at the device, volume, or selected data set level.

RD - RESTORE A DEVICE

The RD option restores the complete contents of a saved disk device to the disk. To restore information from tape, the tape must have been created previously using the save option (SD). Use the RD command to restore a disk device.
For fixed head devices the fixed head volume must have been allocated and initialized before restoring the device.

EXAMPLE: Restore a disk device at address 3.

```
COMMAND (?): RD

        ***   WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVE003

*** WAIT ... SEARCHING TAPE FOR SAVENAME SAVE003 ***

SAVENAME FOUND

ENTER DEVICE ADDRESS IN HEX: 03
RESTORE TO DEVICE ADDRESS 0003 USING SAVENAME SAVE003  OK? (Y/N): Y

DEVICE RESTORE STARTED
DEVICE RESTORE COMPLETED.  246000 RECORDS RESTORED

RESTORE COMMAND (?): EN
```

Press PF1 key to check the progress of the command during the RD command execution.

RESTORE OF MULTIPLE CARTRIDGES

For multiple cartridge restore the program issues the prompts:

END OF TAPE ENCOUNTERED.
RESTORE NOT COMPLETE. DO YOU WISH TO CONTINUE? : Y
INSERT NEXT TAPE CARTRIDGE AND HIT ENTER

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE02
TAPE DESCRIPTION:
This tape contains ...

RESTORE PROCEEDING

If an N or NO is entered for the above prompt the program displays
the following message and returns to the command prompt.

RESTORE ABORTED BY OPERATOR. RESTORE INCOMPLETE.

RV - RESTORE A VOLUME

Use the RV command to restore a specific volume from tape
cartridge to a disk device. To restore a volume from tape, the
tape must have been created previously using the SV option.

EXAMPLE: Restore volume EDX003 on disk from tape.

```
COMMAND (?): RV

          *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: VOL003

*** WAIT ... SEARCHING TAPE FOR SAVENAME VOL003 ***

SAVENAME FOUND

RESTORE TO VOLUME EDX003 FROM SAVENAME VOL003 OK? (Y/N): Y
VOLUME RESTORE STARTED
VOLUME RESTORE COMPLETED.   20000 RECORDS RESTORED

RESTORE COMMAND (?): EN
```

Press PF1 key to check the progress of the command during the RV
command execution.
If the utility detects end of tape during execution of the RV option,
the utility issues the prompt for continuation discussed under the
earlier section, RESTORE OF MULTIPLE CARTRIDGES.

RM - RESTORE SPECIFIC DATA SET(S)

Use the RM command to restore the specific data set(s) from cartridge tape to the disk device. This option restores a single data set, multiple data sets, or data sets with a specific prefix from tape, the tape may have been created previously using any of the save options. To restore all data sets whose names begin with the prefix e.g. DES, you enter the prefix followed by enough question marks to create an eight character name. The question mark(?) is a place-holder as shown below by the three prefix examples.

EXAMPLE : Restore data set(s) from tape to disk volume SMD003.
          The tape data set(s) were saved using the SM option.

```
COMMAND (?): RM

              *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVEDS
*** WAIT ...SEARCHING TAPE FOR SAVENAME SAVEDS

SAVENAME FOUND

RESTORE TO VOLUME EDX003  OK (Y/N) N
ENTER DISK VOLUME: SMD003

RESTORE TO VOLUME SMD003 OK (Y/N) Y

(Enter the names of the data sets you want to restore)

ENTER DATA SET(S) SEPARATED BY SPACES:
BKPTEST                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
$DISKUT1 $COPY TEST TEST3                        OR

ENTER DATA SET(S) SEPARATED BY SPACES:
DES?????                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
???SORTP                                         OR

ENTER DATA SET(S) SEPARATED BY SPACES:
M?1?????

ENTER DATA SET(S) SEPARATED BY SPACES:  (Hit ENTER to end input)

   (List of data sets restored displayed on terminal)
BKPTEST  $DISKUT1 $COPY     TEST      TEST3     DEST3 MY1SORTP

RESTORE COMPLETED  7  DATA SETS RESTORED

RESTORE COMMAND (?): EN
```

EXAMPLE : Restore data set(s) from tape volume EDX002 to disk volume
          SMD002. The data set(s) were saved using the SD option.

```
COMMAND (?): RM

            *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVE003
*** WAIT ...SEARCHING TAPE FOR SAVENAME SAVE003

SAVENAME FOUND

ENTER TAPE VOLUME NAME: EDX002
ENTER DISK VOLUME NAME: SMD002
RESTORE TO DISK VOLUME SMD002 USING TAPE VOLUME EDX002 OK? (Y/N): Y

(Enter the names of the data sets you want to restore)

ENTER DATA SET(S) SEPARATED BY SPACES:
BKPTEST                                     OR

ENTER DATA SET(S) SEPARATED BY SPACES:
$DISKUT1 $COPY TEST TEST2
                                            OR

ENTER DATA SET(S) SEPARATED BY SPACES:
DES?????
                                            OR

ENTER DATA SET(S) SEPARATED BY SPACES:
???MTSOP                                    OR

ENTER DATA SET(S) SEPARATED BY SPACES:
MAT??RES

ENTER DATA SET(S) SEPARATED BY SPACES:  (Hit ENTER to end input)

   (List of data sets restored displayed on terminal)
BKPTEST   $DISKUT1 $COPY      TEST       TEST2      DESCRIP1 PLIMTSOP
MAT12RES

RESTORE COMPLETED   8   DATA SETS RESTORED

RESTORE COMMAND (?): EN
```

If the utility detects the end of tape during execution of the RM
option, the utility issues the prompt discussed in the earlier
section, RESTORE OF MULTIPLE CARTRIDGES.

RA - RESTORE ALL DATA SETS TO A VOLUME

Use the RA command to restore all data sets from a tape volume
to a specific volume on a disk device, the tape may have been
previously created using any of the save options.

EXAMPLE : Restore all data sets to disk volume SMDLIB.
          The tape volume was saved using the SA option.

```
COMMAND (?): RA

            *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVEASM
*** WAIT ...SEARCHING TAPE FOR SAVENAME SAVEASM

SAVENAME FOUND
RESTORE TO VOLUME ASMLIB FROM SAVENAME SAVEASM OK? (Y/N): N
ENTER VOLUME: SMDLIB
RESTORE TO VOLUME SMDLIB FROM SAVENAME SAVEASM OK? (Y/N): Y
RESTORE STARTED

RESTORE COMPLETED   50   DATA SETS RESTORED

RESTORE COMMAND (?): EN
```

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EXAMPLE : Restore all data sets to disk volume SMDLIB
from tape volume ASMLIB. The volume was saved
on tape using the SD option.

```
COMMAND (?): RA

              *** WARNING ***
NO OTHER PROGRAMS SHOULD BE RUNNING TO ENSURE A VALID RESTORE

*** WAIT ... REWINDING TAPE ***

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

ENTER SAVENAME: SAVE003
*** WAIT ...SEARCHING TAPE FOR SAVENAME SAVE003

SAVENAME FOUND
ENTER TAPE VOLUME NAME: ASMLIB
ENTER DISK VOLUME NAME: SMDLIB
RESTORE TO DISK VOLUME SMDLIB USING TAPE VOLUME ASMLIB OK? (Y/N): Y
RESTORE STARTED

RESTORE COMPLETED   50   DATA SETS RESTORED

RESTORE COMMAND (?): EN
```

If the data sets restore spans multiple cartridges refer to the earlier
section, RESTORE OF MULTIPLE CARTRIDGES.

LI - LIST CONTENTS OF TAPE

Use the LI command to display the contents of the cartridge tape
currently in the drive. The command displays the following information.

- Tape identification name and the tape description given during
  initialization.

- Tape savename, the name under which data was saved on the tape.

- Segment number, the sequence number of the tape. The segment
  number in parenthesis, identifies the sequence of the tape in a
  series of tapes containing a single file, volume, or device.

- Device address, the address of the device whose contents were
  saved on the tape.

- Volume name, the name of the volume whose contents were saved on
  tape.

- Data set name(s), the names of the data set(s) saved on tape.

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EXAMPLE: List the contents of the savename SAVE003 for a device save.

```
  COMMAND (?): LI

*** WAIT ... REWINDING TAPE ***

ENTER SAVE NAME (DEFAULT IS LIST ALL): SAVE003

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...


*** WAIT ... LIST IN PROGRESS ***

SAVENAME: SAVE003 (1)
SAVE TYPE: SD
DATE: 11/12/84          TIME   4:00

VOLUME NAME   DEV ADDRESS   FIRST RECORD   SIZE
 EDX002           003             721      20000
 EDX003           003           20721      20000
    .               .               .         .
    .               .               .         .
    .               .               .         .

CONTENTS OF WHICH VOLUME: EDX002

(Enter the name of a volume to display the data set directory.
 Hit enter to skip displaying the data set directory.)

   NAME     TYPE      FIRST RECORD     SIZE     EOD/PGMSZ
 $DASDI    PGM            721           52           52
 WORK      DATA          1721         2000           NA
    .        .             .            .            .
    .        .             .            .            .
    .        .             .            .            .

DO YOU WISH TO CONTINUE? (Y/N): N
LIST COMPLETE ***
*** WAIT ... REWINDING TAPE ***

COMMAND(?): EN
```

EXAMPLE: List the contents of the savename VOL003 for a volume save.

```
COMMAND (?): LI

*** WAIT ... REWINDING TAPE ***

ENTER SAVENAME (DEFAULT IS LIST ALL): VOL003

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

*** WAIT ... LIST IN PROGRESS ***

SAVENAME: VOL003      (1)
SAVE TYPE: SV
DATE: 10/12/84          TIME  4:22

VOLUME                SIZE
EDX003                20000
NUMBER OF DATA SETS SAVED FROM EDX003     5

DISPLAY THE CONTENTS? (Y/N): Y

   DATA SET(S)             SIZE         TYPE
   TEST1                   100          DATA
   TEST2                   500          DATA
   TEST3                   200          P GM
   ASMOBJ                  400          DATA
   ASMWORK                 600          DATA

DO YOU WISH TO CONTINUE? (Y/N): N
LIST COMPLETE ***

COMMAND (?): EN
```

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EXAMPLE: List the contents of the savename SAVEDS for a data set save.

```
COMMAND (?): LI

*** WAIT ... REWINDING TAPE ***

ENTER SAVE NAME (DEFAULT IS LIST ALL): SAVEDS

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

*** WAIT ... LIST IN PROGRESS ***

SAVENAME: SAVEDS             (1)
SAVE TYPE: SM
DATE: 10/12/84          TIME  4:22

VOLUME              SIZE
EDX003              3800
NUMBER OF DATA SETS SAVED ON EDX003     7

DISPLAY THE CONTENTS? (Y/N): Y

   DATA SET(S)            SIZE         TYPE
   BKPTEST               100          DATA
   $DISKUT1              200          P GM
   $COPY                 200          P GM
   TEST                 1000          DATA
   TEST3                1000          DATA
   DEST3                 500          DATA
   MY1SORTP              800          DATA

DO YOU WISH TO CONTINUE? (Y/N): N
LIST COMPLETE ***

COMMAND (?): EN
```

LH - LIST TAPE HEADER

The LH command will display the tape-id and tape description that
is written on the first block of the tape during the Initializtion (I)
or Clear (CL) operations.
The LH command should be run after all Saves are done on a tape to
provide an additional check on the overall operation of the tape.

EXAMPLE: List the tape header

```
COMMAND (?): LH

TAPE-ID: TAPE01
TAPE DESCRIPTION:
This tape contains ...

COMMAND (?): EN
```

If the tape header cannot be read the following message will be
displayed:

TAPE HAS NOT BEEN INITIALIZED

I - INITIALIZE THE TAPE

Use the I option to completely erase the tape and then label the
tape with a tape identification header record consisting of a
TAPE-ID and TAPE DESCRIPTION, followed by an end-of-file record.
This option will destroy all data on tape.

EXAMPLE: Initialize the tape.

```
COMMAND (?): I

***  WARNING !!!  INITIALIZE WILL DESTROY ALL DATA ON THE TAPE ***
DO YOU WISH TO CONTINUE? (Y/N): Y

ENTER TAPE-ID: TAPE01
ENTER TAPE DESCRIPTION:
This tape contains ...

*** WAIT ... ERASE IN PROGRESS ***

*** WAIT ... REWINDING TAPE ***

*** WAIT ... INITIALIZE IN PROGRESS

*** END-OF-FILE-RECORD WRITTEN

*** INITIALIZE COMPLETE ***

COMMAND (?):EN
```

CL - CLEAR THE TAPE

Use the CL option to erase the tape and write an end-of-file record immediately following the existing tape identification header record. This option will destroy all data following the tape identification header record.
EXAMPLE: Clear the tape.

```
COMMAND (?): CL

***  WARNING !!!  CLEAR WILL DESTROY ALL DATA ON THE TAPE ***
DO YOU WISH TO CONTINUE? (Y/N): Y

*** WAIT ... REWINDING TAPE ***

*** WAIT ... CLEAR IN PROGRESS

*** WAIT ... ERASE IN PROGRESS

*** WAIT ... REWINDING TAPE ***

*** END-OF-FILE-RECORD WRITTEN

*** CLEAR COMPLETE ***

COMMAND (?):EN
```

ER - ERASE THE CONTENTS OF THE TAPE

Use the ER option for security purposes to completely erase the tape. This option will completely destroy all data on tape.

EXAMPLE: Erase the tape.

```
COMMAND (?): ER

***  WARNING !!!  ERASE WILL DESTROY ALL DATA ON THE TAPE ***
DO YOU WISH TO CONTINUE? (Y/N): Y

*** WAIT *** ERASE IN PROGRESS ***


*** ERASE COMPLETE ***

COMMAND (?):EN
```

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TN - RETENSION THE TAPE

Use the TN option to retension the tape so it is consistently tensioned. It should be used on a new tape or a tape that has been in storage for a long time.

EXAMPLE: Retension the tape cartridge.

```
COMMAND (?): TN

****   WAIT *** RETENSION IN PROGRESS ****

***   RETENSION COMPLETE  ***

COMMAND (?):
```

VF - READ VERIFY THE TAPE

Use the VF command to verify the readability of the tape cartridge. The command should be executed on a used tape cartridge. Because the command does not destroy data, there is no need to backup the data before verifying the tape. Use attn/CA to abort the verify function.

EXAMPLE: Verify the tape cartridge.

```
COMMAND (?): VF

**** WAIT **** VERIFY IN PROGRESS ****

***   VERIFY COMPLETE ***
nnnnnn BLOCKS VERIFIED nnnnn MARGINAL BLOCKS

COMMAND (?): EN
```

Marginal blocks are tape data blocks that the utility failed to read properly at least once, but did read correctly within sixteen retries.

CF - WRITE CERTIFY THE TAPE

Use the CF option to check the ability to write and read data on
tape. It should only be used on a tape that is having problems or a new
tape. If CERTIFY is used, the user should copy everything from the
tape to disk. The utility certifies the tape by writing a worst case
data pattern on tape and then reading the written data. The tape is
initialized after certifying it. Use attn/CA to halt the command
execution at any time during execution of the certify and verify
functions.

EXAMPLE: Certify the cartridge tape.

```
COMMAND (?): CF

***   WARNING !!!   TAPE CERTIFY WILL DESTROY ALL DATA ON THE TAPE ***
DO YOU WISH TO CONTINUE? (Y/N): Y

READ VERIFY AFTER CERTIFY? (Y/N): Y


*** ... CERTIFY IN PROGRESS ***

***CERTIFY COMPLETE***
nnnnn BLOCKS CERTIFIED     nnnnn MARGINAL BLOCKS
REWINDING TAPE....


***WAIT ...VERIFY IN PROGRESS ***
nnnnn BLOCKS VERIFIED nnnnn MARGINAL BLOCK(S)

ENTER TAPE-ID: TAPE01
ENTER TAPE DESCRIPTION:
This tape contains ...

*** WAIT ... REWINDING TAPE ***

*** WAIT ... ERASE IN PROGRESS ***

*** WAIT ... INITIALIZE IN PROGRESS ***

*** END-OF-FILE-RECORD WRITTEN

*** INITIALIZE COMPLETE ***

COMMAND (?) EN
```

Marginal blocks are tape data blocks that the utility failed to write/
read properly at least once, but did write/read correctly within
sixteen retries.

DA - CHANGE TAPE DEVICE ADDRESS

Use the DA command to change the present tape device address of hexadecimal 4C to a different tape device address.

EXAMPLE: Change tape device address to 06.

```
COMMAND (?): DA

CURRENT TAPE DEVICE ADDRESS IS 4C
ENTER DEVICE ADDRESS IN HEX: 06

COMMAND (?):
```

To keep the current tape device address, the user presses the ENTER key. The current tape device address will not change.

NOTE: To eliminate the need to enter this command every time
        TPCOPY22 is loaded, a patch can be made near the beginning
        of the tapecopy programs using program $DISKUT2. Each
        program (TPCOPY22, TPSAVE22, and TPREST22) requires a one
        word patch to change the default device address.
        Following is a list of the addresses to patch in each of
        the three programs.

	Program patch location	Default device address
TPCOPY22	00BA	F4C3
TPSAVE22	0132	004C
TPREST22	0172	004C

DO - DIRECT OUTPUT TO ANY OTHER TERMINAL

The DO command enables the user to direct listings to any terminal
specified by the user.

The program prompts:

COMMAND (?):

The user enters DO. The name of the terminal can also be entered
after the command with a space in between. If the name of the
terminal is not entered, the program prompts:

ENTER THE NAME OF THE TERMINAL:

The user will enter the name of the terminal where the output from
the program is to be directed.

When using the DO command while in direct mode (ie. non ex-mode)
the following listings will be sent to the terminal specified by
the user:
   . all listings using the LI or LH commands,
   . the names of all the data sets saved using the SM or SA commands,
   . the names of all the data sets restored using the RM or RA
     commands.

While in ex-mode (EX) all output messages, following the DO command,
will be directed to the terminal specified by the user. The only
exception is if multiple cartridges are needed during a save or
restore operation a message indicating necessary user action will
be displayed on the terminal TPCOPY22 was loaded from.

EX - EXECUTE COMMANDS FROM A DATA SET

Use the EX command to perform the EDX utility commands with a minimum
of operator intervention. A data set, created with $FSEDIT, contains
the utility commands. This data set can be invoked using the EX
command, either directly, or indirectly through the EDX job utility
$JOBUTIL. The EX command reads each line of the data set file,
displays each line on the terminal and executes each line as an
utility command.

The following syntax rules must be considered when creating the
execute command data set with $FSEDIT.

- Begin each TPCOPY22 command in position 1.
- Begin the savename in column 4 or any column after column 4.
- Separate the savename(s) and/or volumes with either space(s)
  (any number) or commas.
- Use the EN command to identify the end of the data set to be
  executed with the EX command.
- In EX mode all saves will be appended to the existing data on tape.
- If the Initialization (I) command is used while in EX mode the
  command "I", the tape-id and the tape description must all be
  contained on one line.
- Following is a list of the SYNTAX rules for each of the EX
  TPCOPY22 commands. See COMMAND PARAMETER DEFINITIONS on page
  5-1 for a description of the following parameters.

NOTE: Any of the following parameters enclosed in / / are optional.

```
SD    savename    device-address
SV    savename    disk-volume
SM    savename    disk-volume         dataset1    /dataset2/
      /dataset3/
      /dataset4/  ...
SA    savename    disk-volume
RD    savename    device-address
RV    savename    disk-volume
**        To restore data set member(s) from a tape file that was
          created using the SV, SM or SA commands:
RM    savename    disk-volume  dataseta  /datasetb/  /datasetc/
      /datasetd/          /datasete/ ...
RA    savename    disk-volume
**        To restore data set member(s) from a tape file that was
          created using the SD command:
RM    savename    tape-volume  disk-volume  dataseta  /datasetb/
      /datasetc/ ...
RA    savename    tape-volume   disk-volume
LI    /savename/                       * default is to list entire tape
LH
I     tape-id   tape description
```

```
CL
ER
TN
VF                                     * read verify
CF                                     * read verify and write certify
DA   tape address
DO   /terminal/                        * default is the terminal
                                         TPCOPY22 was loaded from
```

Following are a few examples of EX files.

This first example changes the tape address to 06, directs the output
to $SYSPRTR, clears the tape, saves the device at address 03 using
savename SAVEDEV, lists the contents of the tape, restores the saved
device to the device at address 48, restores some members from tape
volume EDX002 to disk volume SMD002, restores all members from tape
volume ASMLIB to disk volume SMDLIB.

```
DA   06
DO   $SYSPRTR
CL
SD   SAVEDEV 03
LI
RD   SAVEDEV 48
RM   SAVEDEV   EDX002   SMD002   $DISKUT? WORK1 WORK2   $EDXASM
          $EDXLINK
RA   SAVEDEV   ASMLIB   SMDLIB
EN
```

This second example initializes the tape with the tape-id TAPE01,
saves the entire disk volume EDX002 using save name SAVEVOL, saves
all the datasets from disk volume ASMLIB using savename SAVEALL,
saves some specific datasets from disk volume EDX003 using savename
SAVEMEM, lists the contents of savename SAVEALL, restores the
tape volume EDX002 to disk volume SMD002, restores some selected
datasets from the tape volume EDX002 to disk volume EMD002, restores
all the datasets from tape volume ASMLIB to disk volume SMDLIB,
restores some selected datasets from tape volume EDX003 to disk
volume SMD003.

```
I    TAPE01    This tape was created on 11/6/86
SV   SAVEVOL   EDX002
SA   SAVEALL   ASMLIB
SM   SAVEMEM   EDX003   WORK?? TEMP?
LI   SAVEALL
RV   SAVEVOL   SMD002
RM   SAVEVOL   EMD002   $DISKUT? WORK?
RA   SAVEALL   SMDLIB
RM   SAVEMEM   SMD003   WORK1   TEMP1
EN
```

This final example saves the device at address 03 using savename
SAVEDEV then lists the tape header to ensure the overall operation
of the tape.

```
SD   SAVEDEV   03
LH
EN
```

EXECUTE EX COMMAND DIRECTLY

Create a data set of TPCOPY22 utility commands with $FSEDIT.
See the section EX-EXECUTE COMMANDS FROM A DATA SET on page 6-1 for
a list of syntax rules to create the data set. Store the data set
on EXFILE,EDX002.

Following is an example of how to invoke TPCOPY22 commands directly
using the Execute commands (EX).

```
COMMAND (?): EX

ENTER DATA SET (NAME,VOLUME):  EXFILE,EDX002
EXECUTE FROM DATA SET EXFILE ON VOLUME EDX002? (Y/N): Y
```

EXECUTE EX COMMAND THROUGH EDX JOB UTILITY

You can invoke the EX command indirectly through the EDX job utility
$JOBUTIL. To use this method, use $FSEDIT to create two data sets. The
first data set contains the TPCOPY22 utility commands. The second
data set contains the $JOBUTIL instructions, which will open and
execute the first data set.
For example, data set EXFILE, created with $FSEDIT contains TPCOPY22
utility commands. The data set resides on volume EDX002. Use $FSEDIT
to create a data set of job utility instructions as follows:

```
PROGRAM     TPCOPY22,EDX002
PARM        EXFILE,EDX002      (Dataset name and volume of file containing
                                Tapecopy utility commands.)
EXEC
EOJ                            (End of job)
```

Save the job utility data set under any name on any volume, e.g.
    Data set name of job utility instructions   TAPEJOB
    Volume on which data set resides   BACK04

Execute the job utility using the EDX utility $JOBUTIL.

```
$L $JOBUTIL TAPEJOB,BACK04
```

TPCOPY22 loads automatically. Data set EXFILE on EDX002 automatically
opens and the TPCOPY22 utility commands execute. After EXFILE
completes execution, control passes back to the job utility file. The
job ends as the job stream contains no other jobs. A list of the
possible condition codes issued by TPCOPY22 after execution are listed
in the section ERROR MESSAGES on page 9-1. Use these condition codes
to JUMP to label on condition to bypass selected programs in the
job stream or to conditionally abort job utility execution. A
condition code of -1 means TPCOPY22 commands executed successfully.
A condition code of -2 means TPCOPY22 commands executed successfully,
but during a Save or Restore operation the recommended number of
retries was exceeded. (See SOFTWARE RECOMMENDATIONS on pg 3-1 for
a further explaination of the recommended number of retries. See
the flowchart on pg 8-2 to determine the correct action to take.)

The recommended procedure is to load the entire TPCOPY22 utility
from the IPL volume to the system. Loading the entire TPCOPY22
utility onto the system allows the user to execute both save and
restore functions as well as any control functions that might be
needed.

For systems that do not have enough memory, the save (TPSAVE22) and
restore (TPREST22) programs can be loaded directly from the IPL volume.

Load the Cambex program from the IPL volume as follows:

> $L TPSAVE22   (Loads only the program that executes the save
                       functions of the utility.)

> $L TPREST22   (Loads only the program that executes the
                       restore functions of the utility.)

If the save program (TPSAVE22) is loaded separately then only the
save options are displayed to the command prompt (?). Similarly if the
restore (TPREST21) program is loaded separately then only the restore
options are displayed to the command prompt (?).

```
        ┌──────────────────┐
        │ Install          │
        │ TPCOPY22 Rev. C  │
        └──────────────────┘
                 │
        ┌──────────────────┐
        │ Certify (CF)     │
        │ Cartridge "A"    │
        └──────────────────┘
                 │
              /     \
             / Less  \
            / than 50 \         NO
            \ Marginal/ ─────────────────────┐
             \ Blocks/                        │
              \   /                  ┌──────────────────┐
               \ /                   │ Insert new or    │
                │                    │ known good       │
               YES                   │ Cartridge "B"    │
                │                    └──────────────────┘
        ┌──────────────────┐                 │
        │     Use          │        ┌──────────────────┐
        │  Cartridge       │        │ Certify (CF)     │
        │     "A"          │        │ Cartridge "B"    │
        └──────────────────┘        └──────────────────┘
                                             │
                                          /     \
                                         / Less  \
                                        /than 50  \        NO
                                        \ Marginal/ ──────────────┐
                                         \ Blocks /               │
                                          \     /         ┌──────────────────┐
                                           \  /           │ Record CSS if    │
                                            \/            │ available.       │
                                           YES            │ Request E.S.     │
                                            │             │ Maintenance      │
                                   ┌──────────────────┐   └──────────────────┘
                                   │ Replace          │
                                   │ Cartridge "A"    │
                                   └──────────────────┘
```
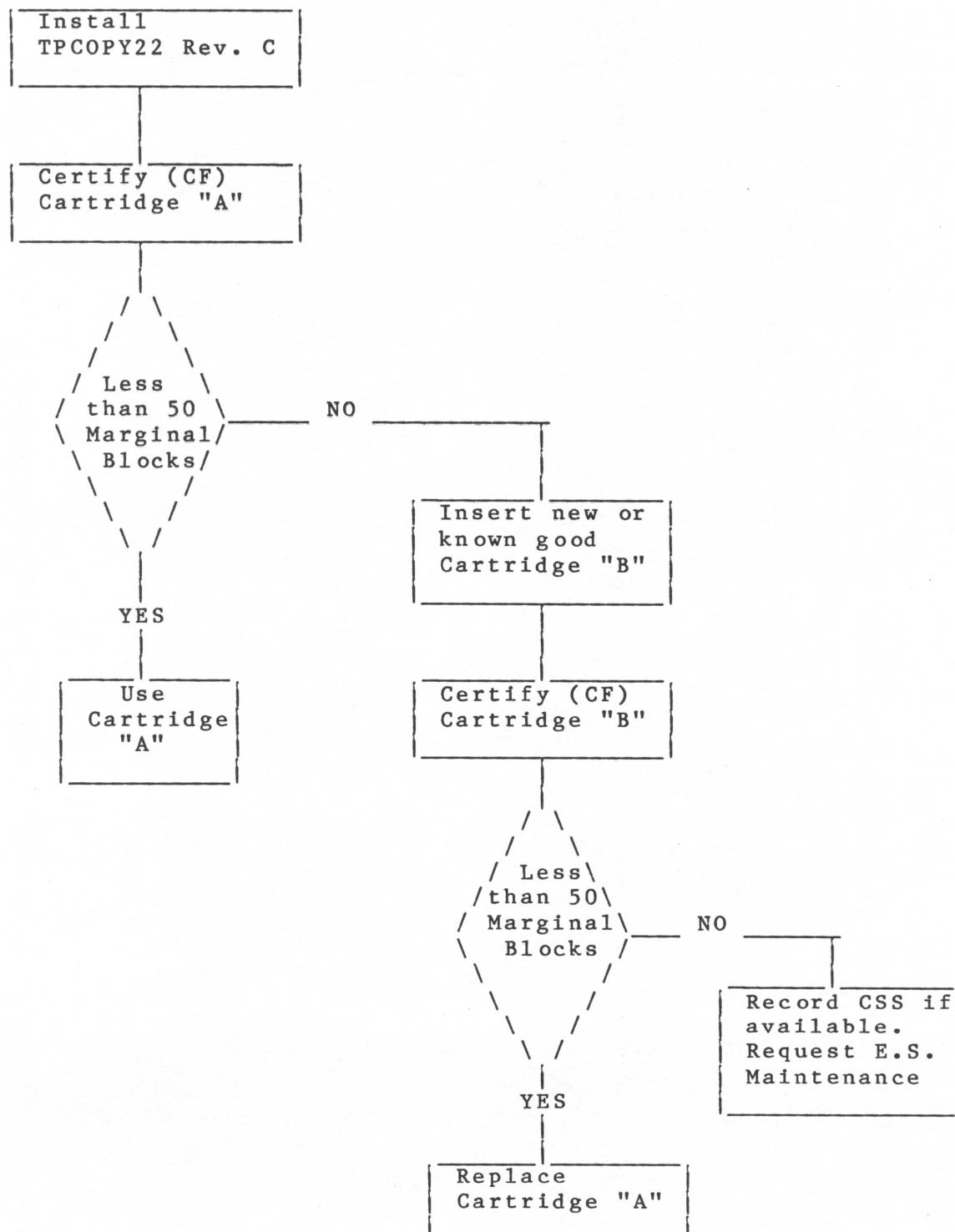
Note:
E.S. = Engineering Services
CSS = Cycle Steal Status

System Has Been Operational
(-2 code occurs)

```
┌─────────────────────┐
│ System reports      │
│ -2 return code      │
└─────────────────────┘
           │
          / \
         /   \
        / Is  \
       / this  \          NO
       \  a    /──────────────────────┐
        \Save /                        │
         \   /                ┌─────────────────────┐
          \ /                 │ Restore             │
           │                  │ Volume (RV)         │
          YES                 └─────────────────────┘
           │                             │
┌─────────────────────┐       ┌─────────────────────┐
│ Certify (CF)        │       │ Replace             │
│ Cartridge           │       │ Cartridge           │
└─────────────────────┘       └─────────────────────┘
           │
          / \
         /   \
        / Less\
       /than 50\         NO
      / Marginal\──────────────────┐
      \ Blocks  /                  │
       \       /         ┌─────────────────────┐
        \     /          │ Replace             │
         \   /           │ Cartridge           │
          \ /            └─────────────────────┘
           │
          Yes
           │
┌─────────────────────┐
│ Reuse               │
│ Cartridge           │
└─────────────────────┘
```

NOTE:
   E.S. = Engineering Services

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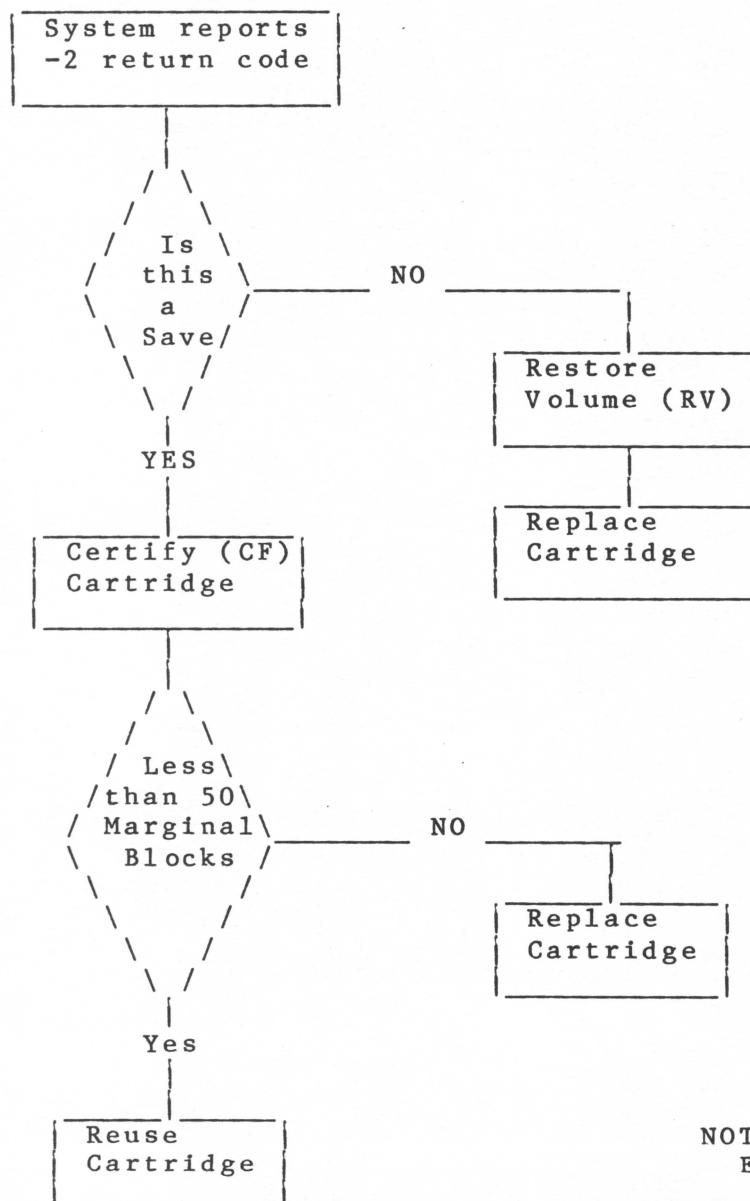
System Has Been Operational
(Hard Error Occurs)
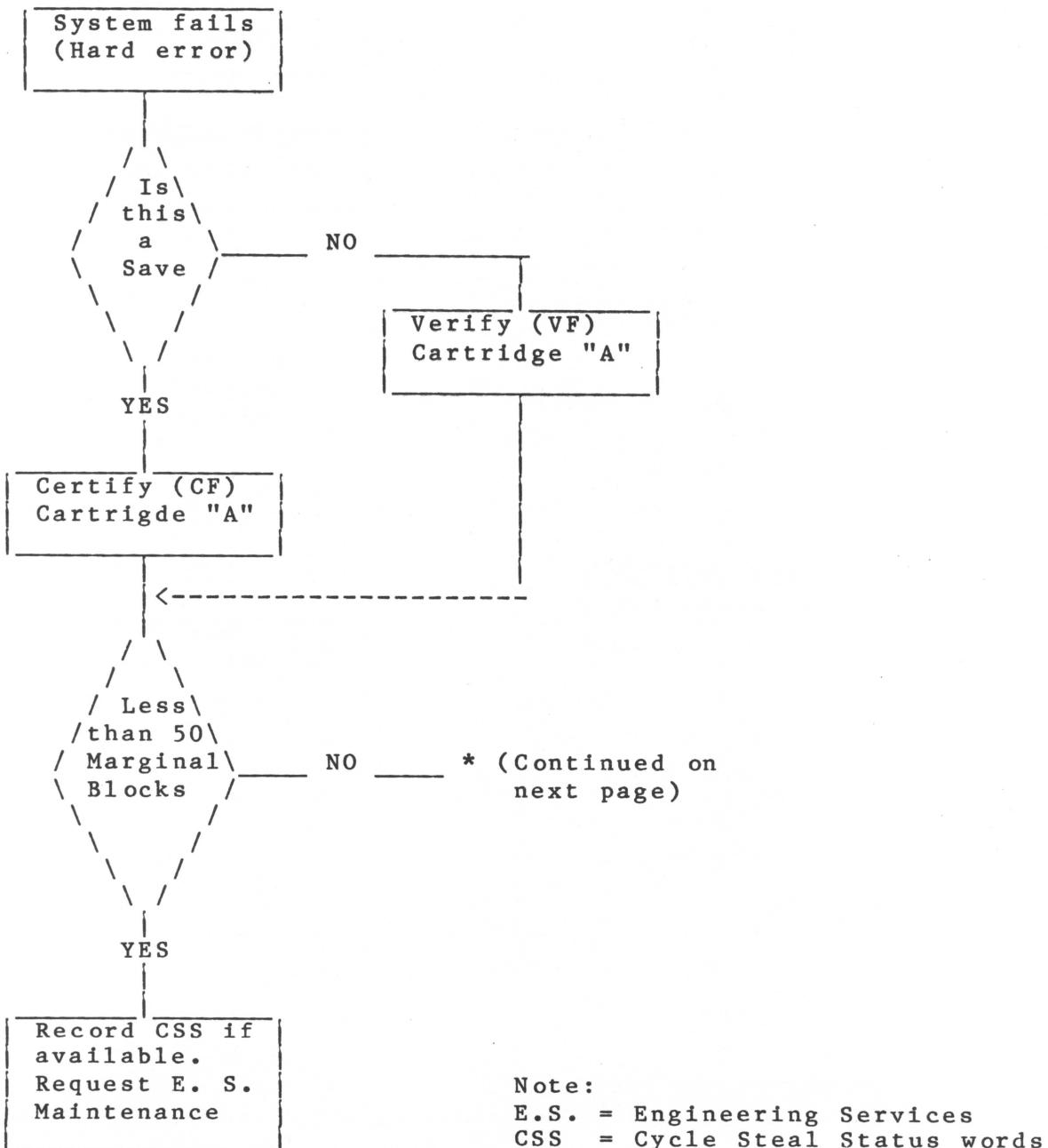
```
        ┌─────────────────┐
        │ System fails    │
        │ (Hard error)    │
        └─────────────────┘
                 │
                / \
               / Is\
              / this\
             /   a   \              ┌──────────────────┐
             \  Save / ──── NO ──── │ Verify (VF)      │
              \     /                │ Cartridge "A"   │
               \   /                 └──────────────────┘
                \ /                          │
                YES                          │
        ┌─────────────────┐                  │
        │ Certify (CF)    │                  │
        │ Cartrigde "A"   │                  │
        └─────────────────┘                  │
                 │                           │
                 │  <─────────────────────────
                / \
               /   \
              / Less\
             /than 50\
            / Marginal\ ____ NO ____  * (Continued on
            \ Blocks  /                  next page)
             \       /
              \     /
               \   /
                \ /
                YES
                 │
        ┌─────────────────┐
        │ Record CSS if   │
        │ available.      │
        │ Request E. S.   │       Note:
        │ Maintenance     │       E.S. = Engineering Services
        └─────────────────┘       CSS  = Cycle Steal Status words
```

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DISK ERRORS

Control file
return codes

100   ERROR OPENING CONTROL FILE
        Unable to open the control file.

101   ERROR READING CONTROL FILE
        A data set read error occurred while reading the control file.

102   ERROR ALLOCATING WORK DATA SET
        Unable to allocate a work data set needed to store the directory
        during a SM, SA, RM or RA.

103   UNABLE TO DELETE WORK DATA SET
        Unable to delete the work data set.

104   ERROR WHILE READING WORK DATA SET
        A data set read error occurred while reading a work data set.

105   ERROR WHILE WRITING TO WORK DATA SET
        A data set write error occurred while writing to a work
        data set.

106   NO SPACE IN WORK DATA SET
        Work data set is full.

107   ERROR OPENING VOLUME
        Unable to open the disk volume.

108   DISK DIRECTORY READ ERROR
        An error was detected while reading the disk directory. The
        save was not performed.

109   DISK NOT INITIALIZED
        The SD option cannot be used on a disk device which has not
        been initialized with the IBM utility $INITDSK.

110   DISK ADDRESS NOT FOUND ON SYSTEM
        There is no disk at the device address specified.

111   VOLUME TOO SMALL FOR RESTORE
        While restoring a volume from tape, the utility found the space
        on the target volume on disk was not large enough. The utility
        displays the sizes of the source and target volumes thus:
                TAPE RECORD COUNT = XXXX
                DISK RECORD COUNT = XXXX

112   INVALID DEVICE ADDRESS
         The device address specified is not correct. It must be in the
         range of 00-FF.

113   ERROR ALLOCATING DATA SET
         Unable to allocate a data set on the specified volume.

N/A   DISK READ ERROR
         An error was detected in reading the data from disk.
         The user has the option to continue the save command by
         filling in the record in error with x'FF'.
         If a DISK READ ERROR occurs while running in ex-mode
         the save will automatically continue.

N/A   DISK WRITE ERROR
         Tape cartridge was unable to write data to the disk.
         The user has the option to continue the restore command
         by skipping over the record in error.
         If a DISK WRITE ERROR occurs while running in ex-mode
         the restore will automatically continue.

N/A   INSUFFICIENT CONTIGUOUS SPACE IN VOLUME
         The utility could not find enough contiguous space on
         disk while executing the RM or RA command.

N/A   INSUFFICIENT DIRECTORY SPACE
         The utility detected a full disk directory while executing
         the RM or RA command.

N/A   INSUFFICIENT SPACE IN VOLUME
         While restoring data to the disk using the RM or RA option,
         the utility ran out of space on the volume to which the
         data was being restored.

N/A   TYPE MISMATCH OF DATA SETS
         The data sets specified for the RA or RM option did not
         match in type (program versus data) the data sets on the disk.
         Delete or rename the data sets on disk.

N/A   UNKNOWN DS OPEN ERROR
         Unable to open data set.

N/A   VOLUME EMPTY
         The volume specified for the SM, SA or SV options
         contained no data sets.

N/A   VOLUME NOT FOUND
         The volume specified for the save or restore option
         does not exist.

N/A   VOLUME NOT INITIALIZED. CANNOT SAVE
         The utility saves only volumes initialized by the IBM
         utility $INITDSK.

TAPE ERRORS (HARD)

The Cycle Steal Status words will be displayed after any hard tape
error. If the error is correctable without the assistance of
Engineering Services disregard the Cycle Steal Status words. If the
assistance of Engineering Services is needed record the Cycle Steal
Status words and give to the Customer Engineer.

Control file
return codes

-2   *** WARNING ***
        THIS TAPE HAS EXCEEDED THE RECOMMENDED NUMBER OF RETRIES
        See SOFTWARE RECOMMENDATIONS on page 3-1 for an explaination
        of the recommended number of retries. Refer to the flowchart
        on page 8-2 for the correct procedure to be followed.

120   UNRECOVERABLE TAPE READ ERROR
        The cartridge tape drive cannot read the data on tape.
        Refer to the flowchart on page 8-3 for the correct procedure
        to be followed.

121   UNRECOVERABLE TAPE WRITE ERROR
        The cartridge tape drive cannot write the data to the tape.
        Refer to the flowchart on page 8-3 for the correct procedure
        to follow.

122   UNKNOWN TAPE ERROR
        An unknown tape error occurred. Retry the operation, if
        an UNKNOWN TAPE ERROR still occurs, refer to the flowchart
        on page 8-3 for the correct procedure to follow.

123   WRITE ERROR WHILE ATTEMPTING TO WRITE END-OF-FILE MARKER
        Unable to write the end-of-file marker.

124   DEVICE AT ADDRESS IS NOT A TAPE
        The tape address specified is incorrect.

125   TAPE CARTRIDGE IS WRITE PROTECTED
        The write protect switch is set on the cartridge tape. No
        data can be written to the tape.

126   CARTRIDGE NOT INSERTED
        No tape cartridge inserted in tape unit.

127   TAPE UNIT NOT OPERATIONAL
        FATAL ERROR. Record the cycle steal status words and contact
        Engineering Services.

128   CRC ERROR
        The data read from tape is invalid, retry the operation.

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N/A   TAPE READ ERROR
An error was detected trying to read from the tape.
The user has the option of continuing the restore by filling
in the record in error with x'FF'.
If the tape read error occurred while in ex-mode (EX) the
restore will automatically continue.

N/A   TAPE DATA SETS NOT ALLOWED
The utility tried to save or restore data sets residing
on the IBM tape unit.

EXIO ERRORS

Control file
return codes

140   ERROR OPENING TAPE UNIT
        Unable to open the streaming tape unit.

141   TAPE DRIVE IN USE BY ANOTHER PROGRAM
        The cartridge tape is currently being used by another program.
        EDX may be accessing the tape drive from another partition.

142   TAPE UNIT ADDRESS INCORRECT
        The device address for the tape drive is invalid.

143   EXIO ERROR
        An error was detected while trying to perform an EXIO
        operation on tape.

CONTROL FILE ERRORS

Control file
return codes

160   INVALID COMMAND
        An invalid operation was read from the control file.

161   TAPE DEVICE ADDRESS MISSING FROM DA COMMAND
        A device address must be included when using the DA command
        within a control file.

162   SAVENAME INVALID OR MISSING
        Savename is missing or invalid from the control file.

163   VOLUME NAME INVALID OR MISSING
        Volume name is missing or invalid from the control file.

164   DATA SET NAME INVALID OR MISSING
        Data set name is missing or invalid from the control file.

MISC. ERRORS

Control file
return codes

180 TAPE HAS NOT BEEN INITIALIZED
    The tape cannot be used for any of the save, restore or list
    options until it has been initialized using the I command.

181 DEVICE DIRECTORY NOT FOUND
    The device directory on tape cannot be found for RM or RA
    options.

182 VOLUME NOT FOUND IN DIRECTORY
    Volume not found in the device directory on tape.

183 DATA SET DIRECTORY NOT FOUND FOR VOLUME
    The data set directory for the specified volume not found on
    tape for the RM, RA or LI options.

185 SAVENAME NOT FOUND
    The savename specified for a restore operation does not exist
    on this tape.

186 SAVENAME ALREADY EXISTS ON TAPE
    A cartridge tape cannot have duplicate savenames.

187 SAVENAME IS NOT A VOLUME SAVE
    The RV command was used to restore data that had not been
    saved using the SV command.

188 SAVENAME IS NOT A DEVICE SAVE
    The RD command was used to restore data, from tape, that had
    not been saved using the SD command.

189 SAVE PROGRAM LOAD FAILURE
    Unable to load TPSAVE21.

190 RESTORE PROGRAM LOAD FAILURE
    Unable to load TPREST21.

191 SAVE WAS NOT DONE ON V2M1
    Cannot restore data using V2M1 tapecopy programs that was
    saved using V2M0 or earlier tapecopy programs.

192 DATA SET NAMES MUST NOT EXCEED 958
    958 is the maximum data set names that can be entered
    during a SM or RM.

193 TAPE DATA SET DIRECTORY ERROR
    Have read past data set on tape. Retry the restore command.

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194   END OF RECORDED DATA. RESTORE INCOMPLETE
       The utility encountered end of saved data on tape while
       restoring data to the disk. This occurs when a save operation
       was aborted by the operator.

195   BLANK TAPE
       Trying perform one of the restore operations from a blank tape.

196   THIS TAPE CONTAINS A CONTINUATION OF SAVENAME
       Found the savename to be used for the restore, but it is a
       continuation tape. Must insert the first tape of the specified
       savename.

197   NO AVAILABLE SPACE ON TAPE
       No data can be saved on the tape cartridge as it is full.
       Insert another blank tape or erase the currently mounted
       cartridge tape. If trying to perform the save from a control
       file the operation is aborted.

198   HEADER DATA EXPECTED AND NOT FOUND
       The tape cartridge was unable to find a header.

199   INVALID TAPE UNIT ADDRESS
       The tape unit device address specified with the DA command
       is invalid.

200   OPERATOR ABORT
       The operation was aborted by the operator.

N/A   DATA SET NOT FOUND OR DUPLICATE DATA SET NAME
       The specified data set does not exist on disk for the
       SM option or the data set does not exist on tape for the
       RM option or the data set name was entered more than once.

N/A   VOLUME NOT FOUND ON SAVED DEVICE
       The specified volume was not found in the device directory
       on tape for the RM, RA or LI options.

N/A   INPUT ERROR. TOO MANY CHARACTERS
       Invalid data entered by the user. Check user's guide
       for correct syntax.

N/A   INVALID COMMAND
       An invalid command was entered. Enter "?" after the command
       prompt for a list of the valid commands.

N/A   INVALID DATE
       The date was not entered correctly.

N/A   INVALID TIME
       The time was not entered correctly.

N/A   NO DATA SETS FOUND
        None of the data sets entered by the user for saving were
        found in the disk directory or for restoring were found in
        the tape directory.

N/A   RESTORE ABORTED BY OPERATOR. RESTORE INCOMPLETE
        The operator aborted a restore operation by entering attn/ABORT.

N/A   NOT A CONTINUATION TAPE
        This tape is not a continuation of the file being restored.

N/A   NOT TAPE. USE DA COMMAND TO SET DEVICE ADDRESS
        The tape device address is not the default device address.
        Must use the DA command to set device address.

N/A   SAVENAME DOES NOT MATCH THIS TAPE
        The cartridge tape used to continue a restore operation has
        a different savename than the one on the previous cartridge. On
        a multi-tape restore all the cartridge tapes of the series must
        have the same savename.

N/A   WRONG TAPE SEQUENCE
        While performing a restore operation of a multi-tape
        volume the tape inserted to continue the restore is not
        the next tape in sequence.

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